STRUCTURE OF THE ST. FRANCOIS MOUNTAINS AND SURROUNDING LEAD BELT, S.E. MISSOURI: INFERENCES FROM THERMAL IR AND OTHER DATA SETS

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1. PROBLEMS: No problems impeded the progress of our investigation

2. ACCOMPLISHMENTS: The following HCMM image data sets were the subjects of intense analysis during August, September, and October: A-A0045-19420-2 (Day-IR), A-A0045-A420-1 (Day-visible), and A-A0044-08310-3 (Night-IR). These frames were chosen because they cover our test area (the Ozark Plateau and St. Francois Mountains) and they are cloud free. The data were acquired during June, 1978. Unfortunately, day-night pairs without significant cloud cover do not exist for the winter season.

All three images were contrast-enhanced, using a linear stretch. In addition, the night-time image was de-striped using a box-car filtering approach. Apparent thermal inertia images were generated from the data. The enhanced data and the apparent thermal inertia data were also registered and overlayed onto shaded relief images depicting topography and onto a colored version of the Missouri geologic map.

The significant finding during this reporting period was that the combination of the apparent thermal inertia image and the shaded relief map proved to have the greatest discriminability in terms of portraying linear features. The reason seems to be that the vegetation canopy on the Ozark Plateau is different for hill slopes as opposed to valleys. The hills are covered by oak forest while the valleys are usually cultivated or used for grazing. Consequently, the thermal inertias are different. Also, our apparent thermal inertia images do not have differential heating related to topography removed. Thus, the combination of what are probably intrinsic differences in thermal inertia, and the slope-related effects due to topography, tend to emphasize subtle topographic effects. Merging the inertia image with the topography generates a non-linear enhancement of subtle topographic variations. Figures 1, 2, and 3 show an apparent thermal inertia image, an enhanced daytime IR image overlayed onto topography, and an inertia image overlayed onto topography. The difference in discriminability of linear features, some of which are mapped as faults, is clear.

We are currently in the process of writing a manuscript for the J. Remote Sensing describing these results. Finally, during our meetings with mineral, oil, and gas exploration firms, we have discussed the utility of HCMM, merged with other data, as an adjunct technique for exploration.

3. TOTAL FUNDS EXPENDED 8/1/81 - 10/31/81: $5,800.00

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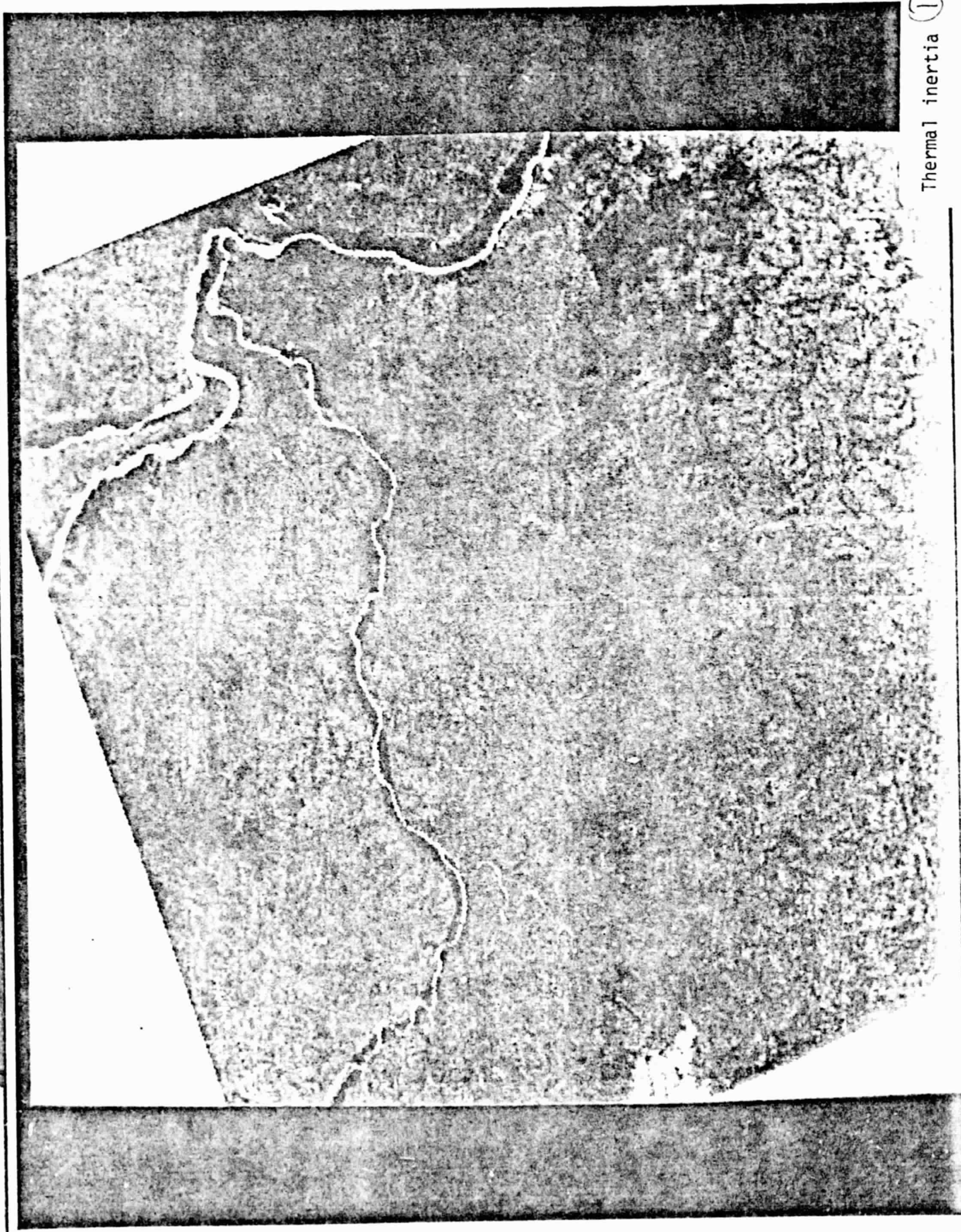

Thermal inertia (1)

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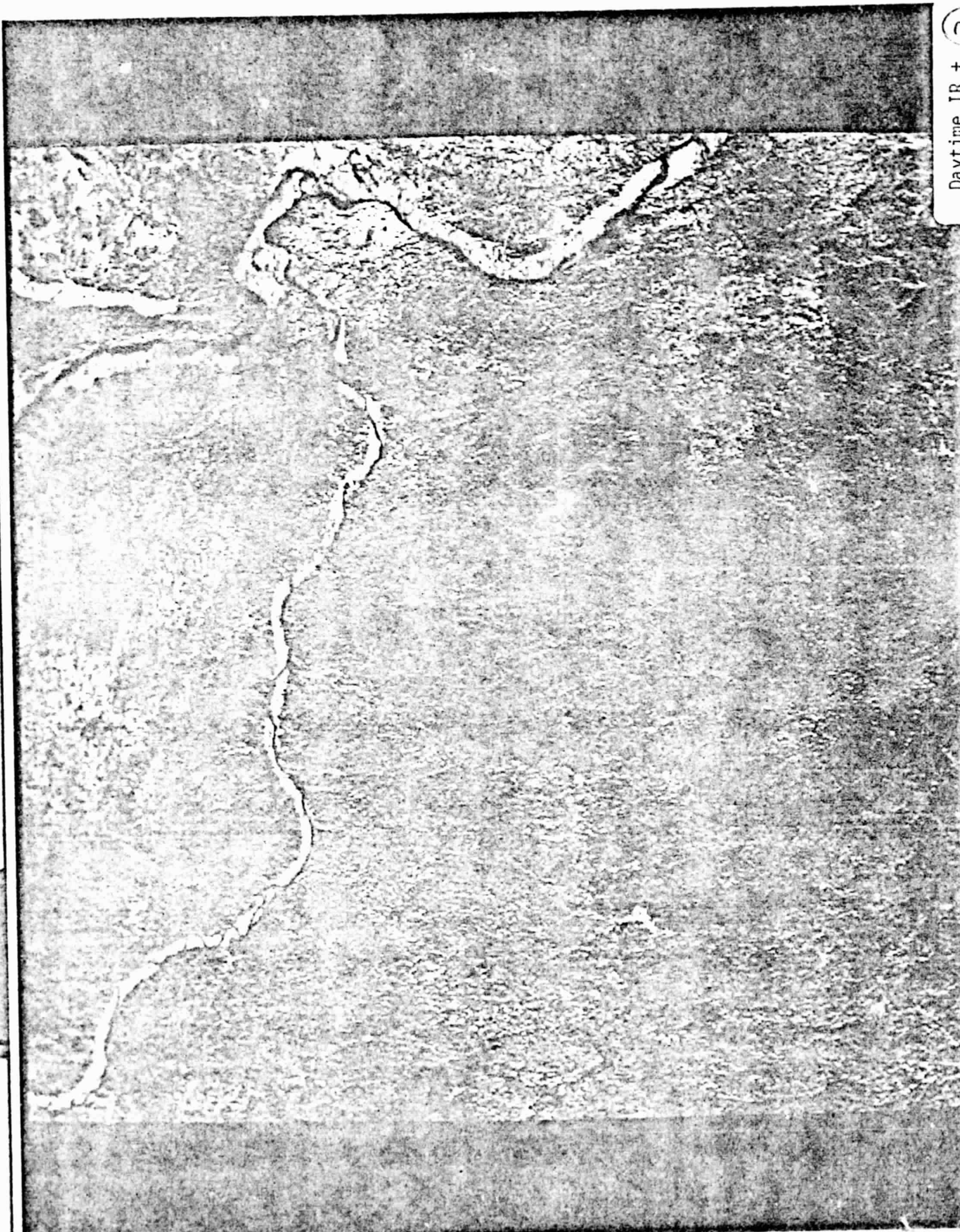
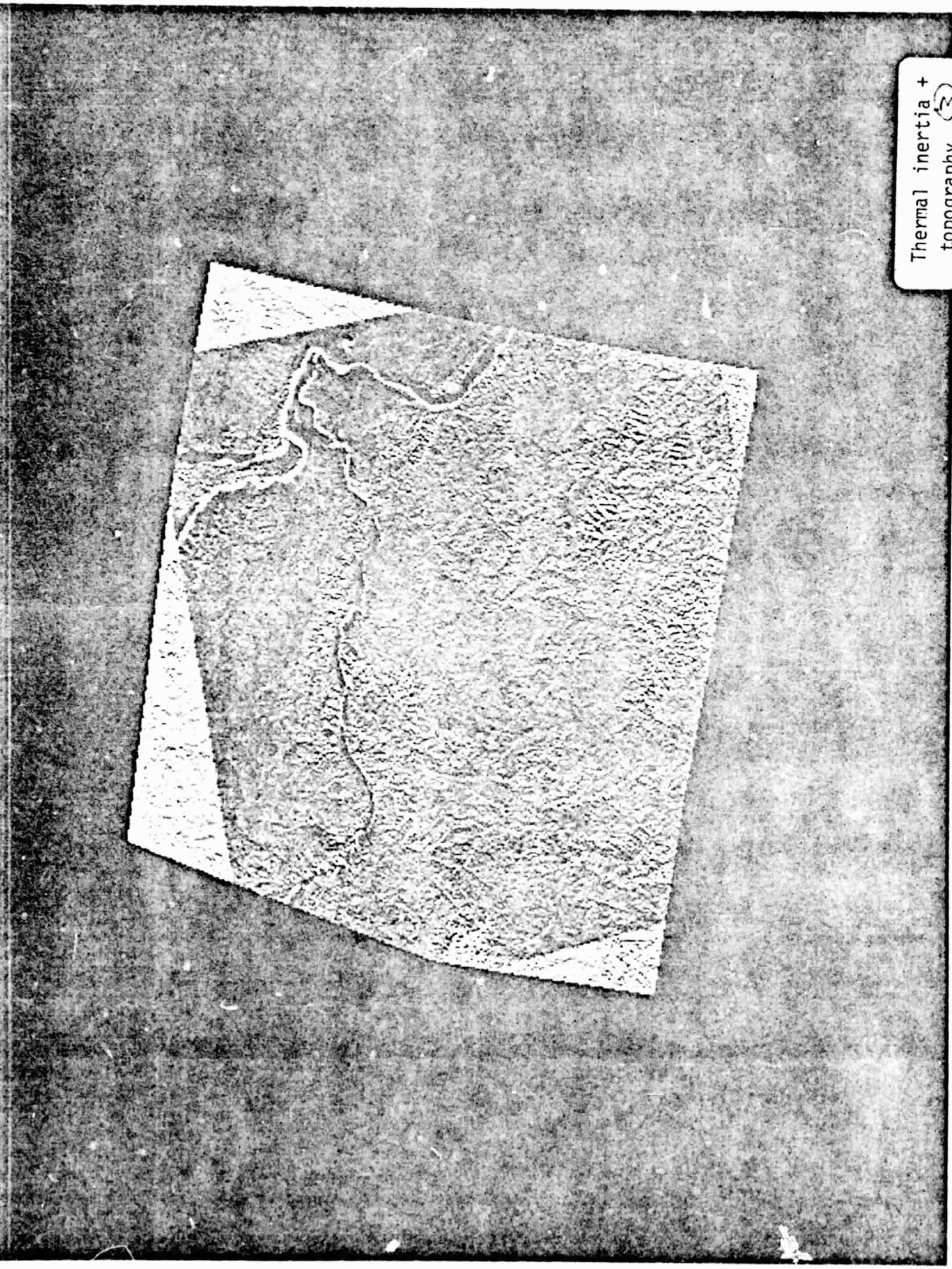
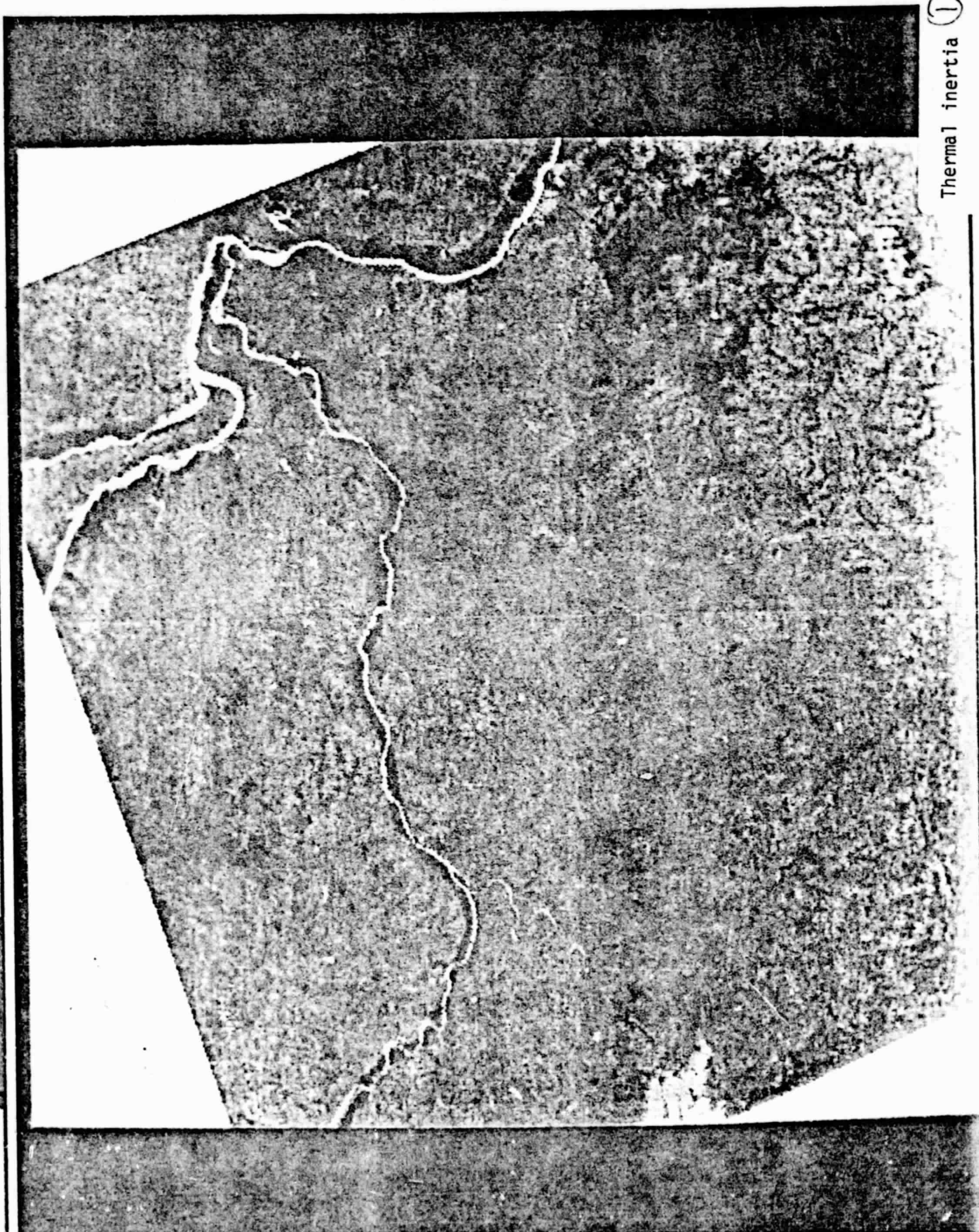


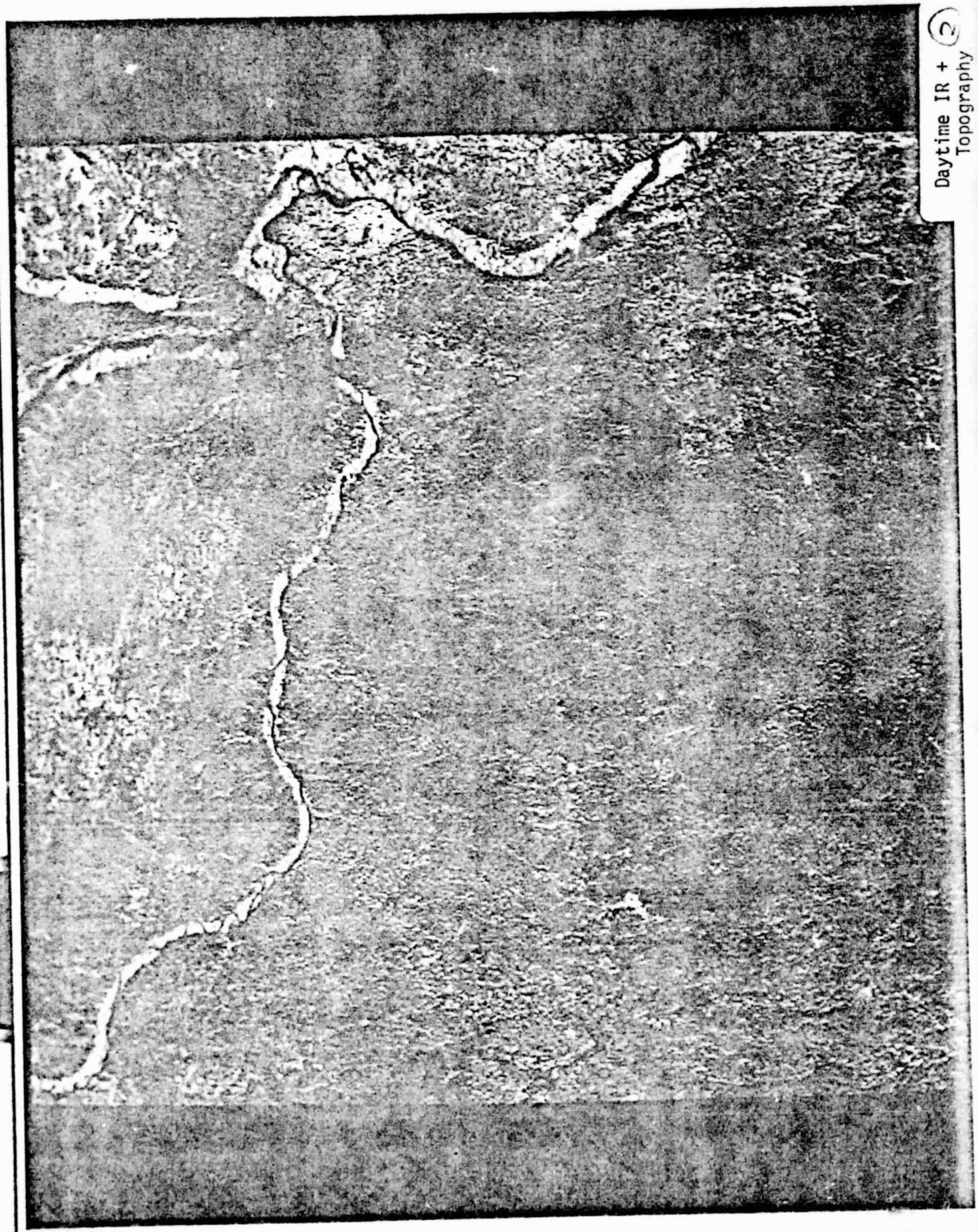
Daytime IR + Topography ②

Thermal inertia + topography (3)





Thermal inertia (1)



Daytime IR + (2)
Topography